



*Hilton Columbus
Downtown*

Showcase Project: Hilton Columbus Downtown

SECTOR TYPE

Commercial

LOCATION

Columbus, Ohio

PROJECT SIZE

453,000 Square Feet

FINANCIAL OVERVIEW

Project Cost \$140 Million



Annual Energy Use

(Source EUI)

Baseline ASHRAE Standard



281 kBtu/sq. ft.

Actual (2013)



194 kBtu/sq. ft.

Energy Savings:

32%

Annual Energy Cost

Baseline ASHRAE Standard



\$1,001,000

Actual (2013)



\$614,000

Cost Savings:

\$387,000

BACKGROUND

The Hilton Columbus Downtown is a newly-built 532-room hotel which was designed to be 32% more efficient than required by the ASHRAE 90.1-2007 standard. The property features a number of energy conservation measures (including efficient lighting, a building automation system, and variable frequency drives. As a result, Hilton Worldwide saved 32% in annual energy consumption and \$387,000 in annual energy costs versus ASHRAE 90.1 2007.

The Hilton Columbus Downtown, located in the heart of the city near Ohio State University, was designed with the downtown in mind. The property contains 32,000 square feet of event space, a 160-seat full-service restaurant and fitness center, and an indoor pool and whirlpool.

SOLUTIONS

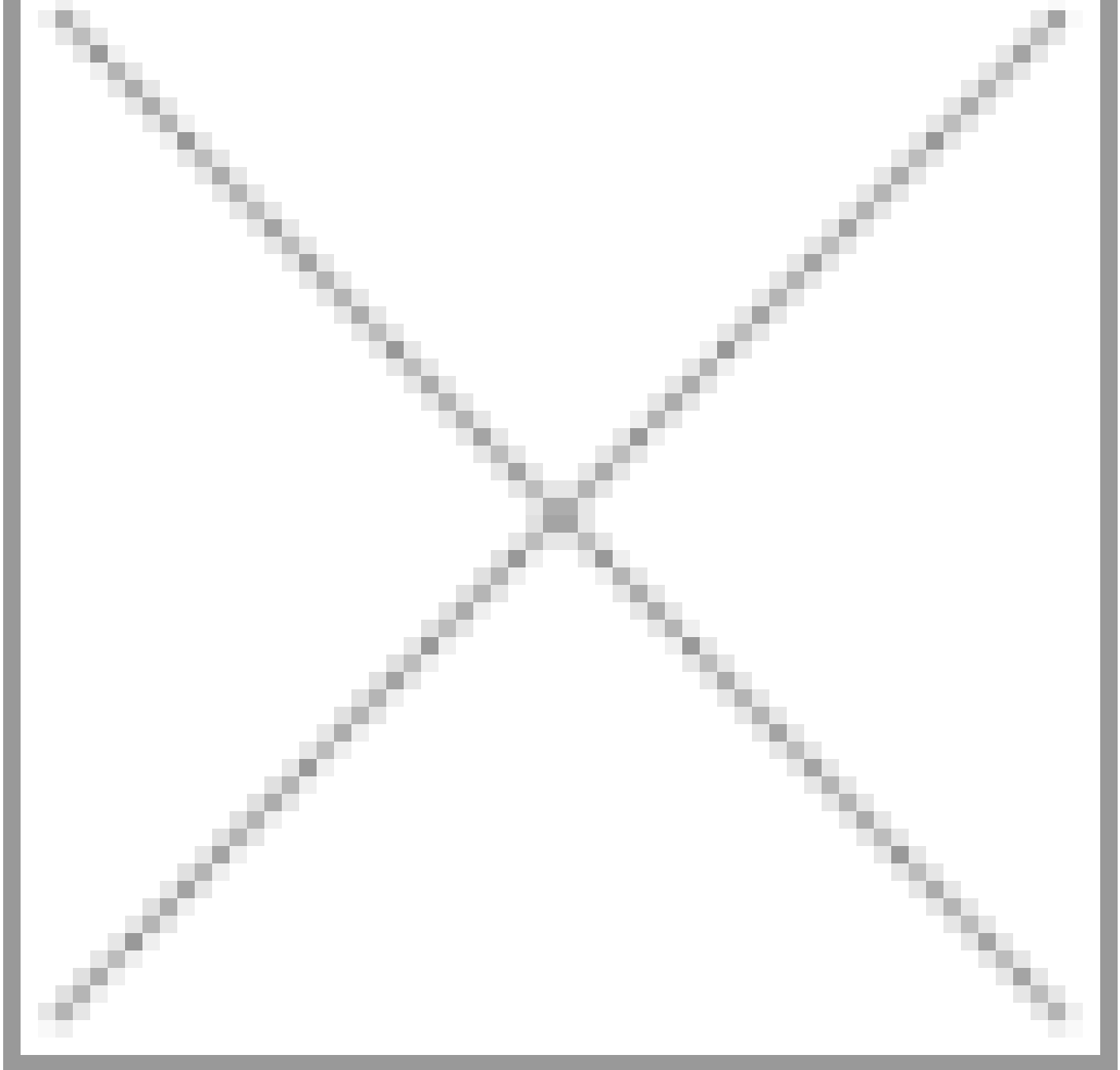
In addition to installing highly-efficient lighting by participating in a U.S. Department of Energy [Next Generation Luminaire \(NGL\) Demonstration Project](#) via the [Better Buildings Alliance](#), Hilton installed lighting controls, guestroom thermostats with occupancy controls, an advanced Building Automation System, a heat recovery chiller, a heat reclamation system to heat the swimming pool, highly-efficient boilers and water heaters, variable frequency drives, and ENERGY STAR appliances.

- Installed high-efficiency lighting throughout hotel, including halogen, ceramic metal halide, LED, and

- fluorescent.
- Participated in a U.S. Department of Energy [Next Generation Luminaire \(NGL\) Demonstration Project](#) via the [Better Buildings Alliance](#) in order to install 3,700 highly-efficient LED downlights in all 532 guest rooms and suites, reducing lighting electricity usage by over 20% (an estimated savings of over \$10,000 per year) compared with the lighting power allowance of 330 watts per guest room dictated by ASHRAE 90.1 2007.
- Installed dimming controls on NGL downlights, allowing the Building Automation System to automatically dim lights when sufficient sunlight is present and giving guests the ability to dim two window soffit lights and three bathroom lights in each room.
- Installed occupancy sensors in public spaces, offices, storage rooms, and guestroom bathrooms to automatically shut off lighting when unoccupied.
- Installed ENERGY STAR-rated appliances.
- Installed 95%-efficient water heaters and heating boilers (compared to 80-85% industry standard).
- Installed guestroom thermostats which detect room occupancy and automatically turn heating and cooling off when a room is unoccupied
- Installed variable frequency drives on all motors, allowing them to run on demand rather than 100% of the time.
- Designed Building Automation System (BAS) to monitor and adjust operating levels of equipment including boilers and chillers based on occupancy. An outside vendor monitors the hotel's BAS to maximize efficiency.
- Excess heat from refrigerators and freezers is reclaimed to heat the swimming pool through the process loop, which is kept at a neutral 70 degrees. As the pool removes heat from the process loop, heat pumps use cooling from the process loop for space conditioning (to cool air in other spaces).
- Installed an energy recovery chiller that is connected to the hotel's hot water loop in addition to its chilled water loop. This energy recovery chiller essentially serves as the boiler whenever outside temperatures exceed 55 degrees Fahrenheit, when it runs to a hot water setpoint ranging between 140 and 125 degrees Fahrenheit depending on outside temperature. Hot water is transferred from the energy recovery chiller to the hotel's heating loop, where it is used to satisfy dehumidification and space heating demands throughout the hotel. This means that boilers do not need to be turned on in warm weather. In 2014, none of the hotel's boilers ran all summer because outside temperatures remained above 55 degrees. While a standard chiller's condenser loop rejects heat to the atmosphere through a cooling tower, this energy recovery chiller is able to use heat to produce hot water in addition to chilled water. The chilled water it produces is used to pre-chill water before it enters the main cooling chillers.

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https://www4.eere.energy.gov/challenge/sites/default/files/uploaded-files/Hilton_Columbus_Downtown_Hot_Water_System.jpg



Screenshot of the Hilton Columbus Downtown Building Management System's web-based interface in January 2015, depicting its heating system, including the energy recovery chiller (Chiller-3, bottom left) and its connection to the hotel's heating loop (in red).

When the outside temperature falls below 45 degrees, the energy recovery chiller is set to produce 42-degree chilled water, which is used to provide on-demand cooling. This allows the hotel's main cooling chillers to remain off when it's cold outside instead of having to run to meet small cooling demands within the hotel. The resulting hot water (in the energy recovery chiller's condenser loop) is used to pre-heat the hotel's heating loop.

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https://www4.eere.energy.gov/challenge/sites/default/files/uploaded-files/Hilton_Columbus_Downtown_Chilled_Water_System.jpg



Screenshot of the Hilton Columbus Downtown Building Management System's web-based interface in January 2015, depicting its chilled water system, including the energy recovery chiller (Chiller-3, bottom right), which is running, and main cooling chillers (Chiller-1 and Chiller-2, left), which are not in use because outside air temperature is 33 degrees Fahrenheit.

OTHER BENEFITS

The property has achieved LEED NC Gold certification. Water conservation measures such as low flow shower heads, faucets, toilets and urinals are expected to result in water savings of 30% or 1,000,000 gallons annually.

[Hilton Columbus Downtown LEED Overview](#)